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Trends in Timber Use and Product Recovery in New York

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Abstract

High demand for a variety of timber products from New York's forests has stimulated increased timber utilization and product recovery. Utilization studies in New York suggest that the recovery of timber has improved over the years. Although current methods of multiproduct harvesting have improved recovery of residual material, an estimated 38.6 million cubic feet, or 16 percent of the total volume harvested for industrial roundwood products, remain unused. There are many opportunities to recover additional amounts of wood materials from the tops of trees, trees destroyed by harvesting, and nongrowing-stock trees. Modifications to current multiproduct harvesting systems could further increase the recovery of these harvesting residues.

Although timber managers have encouraged better harvesting practices for years, only recently have timber growers, harvesters, and processors begun to improve timber recovery. They have found that the most direct way to stretch the current roundwood timber supply is to use more of each tree that is harvested or downed in the process of harvesting other trees. In addition to increasing wood recovery from these trees, there are many opportunities to recover acceptable wood materials from poorly formed and defective trees. These trees often account for much of the harvesting residue, especially where hardwood stands are harvested.

To track the status of the Nation's forest resources, and how they are used for wood products over time, ongoing studies are conducted by the USDA Forest Service. The Forest and Rangeland Renewable Resources Planning Act of 1974 and more recent legislation authorize the Forest Service to conduct periodic forest resource inventories in all 50 states. The Forest Inventory and Analysis unit of the Northeastern Research Station is responsible for conducting inventories in New York and 12 other Northeastern States.

New York's timberlands have been inventoried four times. The most recent inventory was completed in 1993 (Alerich and Drake 1995). Previous inventories were conducted for 1952 (Armstrong and Bjorkbom 1956), 1967 (Ferguson and Mayer 1970), and 1979 (Considine and Frieswyk 1982). During these inventories, scientists determine how the state's forest resources are used by assessing wood removals. Wood removals is the volume of timber harvested or killed through logging, cultural operations (such as timber stand improvement), or land clearing. It also includes the volume of timber neither harvested nor killed but growing on land that was reclassified from timberland to noncommercial forest land, which typically includes parks and preserves. For this report we concentrated on the volume of timber harvested or killed through logging.

A utilization study is conducted in conjunction with the standard resource inventory to help quantify the kinds of trees and components of trees that are affected by wood removed for roundwood products, and the amount of harvesting residue generated. The study consists of a sample of active harvesting operations throughout the state. For New York, measurements were taken on more than 900 trees at 24 harvest sites. Field crews measured trees before they were harvested to determine species, size, condition, and merchantability. Following harvesting operations, the crews measured log volumes and assigned products for which they were harvested.

The measurements enabled researchers to compute volume based on both inventory specifications and how a tree was harvested (Fig. 1). The volume that could be recovered was determined by the timber harvester; it represented his or her assessment of the usable volume contained in each tree.

Figure 1.–Once the timber harvester designates buck points and identifies the products, log-scale measurements are taken.

Trends in Product Recovery

Successive inventories in New York have revealed an important change in the portion of the total harvest that is from growing stock. Growing stock, a classification of trees important to the forestry community, relates to the volume in live trees of commercial species that generally is suitable for industrial roundwood products such as sawlogs, veneer logs, and pulpwood. By Forest Service definition, it is the portion of trees 5.0 inches in diameter and larger from a 1-foot stump to a 4-inch top diameter outside the bark of the central stem, or to the point where the central stem breaks into limbs if that occurs before this point.

In 1952, 85 percent of the roundwood products removed was from growing stock; in 1967, 76 percent of the roundwood removed was from growing stock (Fig. 2). Little roundwood was harvested from other sources, for example, the tops and limbs of trees, cull trees, cull sections of trees, and dead trees. Cull trees do not contain one 12-foot sawlog, or two noncontiguous 8-foot sawlogs that meet regional specifications for freedom from defect due to rot or poor form.

In 1979, removals for roundwood products in New York rose to about 418 million cubic feet, largely due to extensive fuelwood harvesting. However, only 41 percent of this amount was from growing stock. This was due to a decrease in the use of growing stock for industrial roundwood products, as well as the nature of fuelwood harvesting. A previous study of fuelwood harvesting by source of material (Wharton 1991) showed that most fuelwood is from material such as cull and dead trees, rather than from growing stock.

By 1993, the portion removed from growing stock had dropped to 34 percent, or about 69 million cubic feet. During that time, fuelwood use also declined (Canham and Martin 1996). Thus, while the amount of growing-stock removed for roundwood has fluctuated (influenced by total roundwood removals), the proportion from growing stock has declined steadily, even when industrial roundwood products are harvested. This is most likely the result of improved utilization practices. These percentages differ according to the product that is removed.

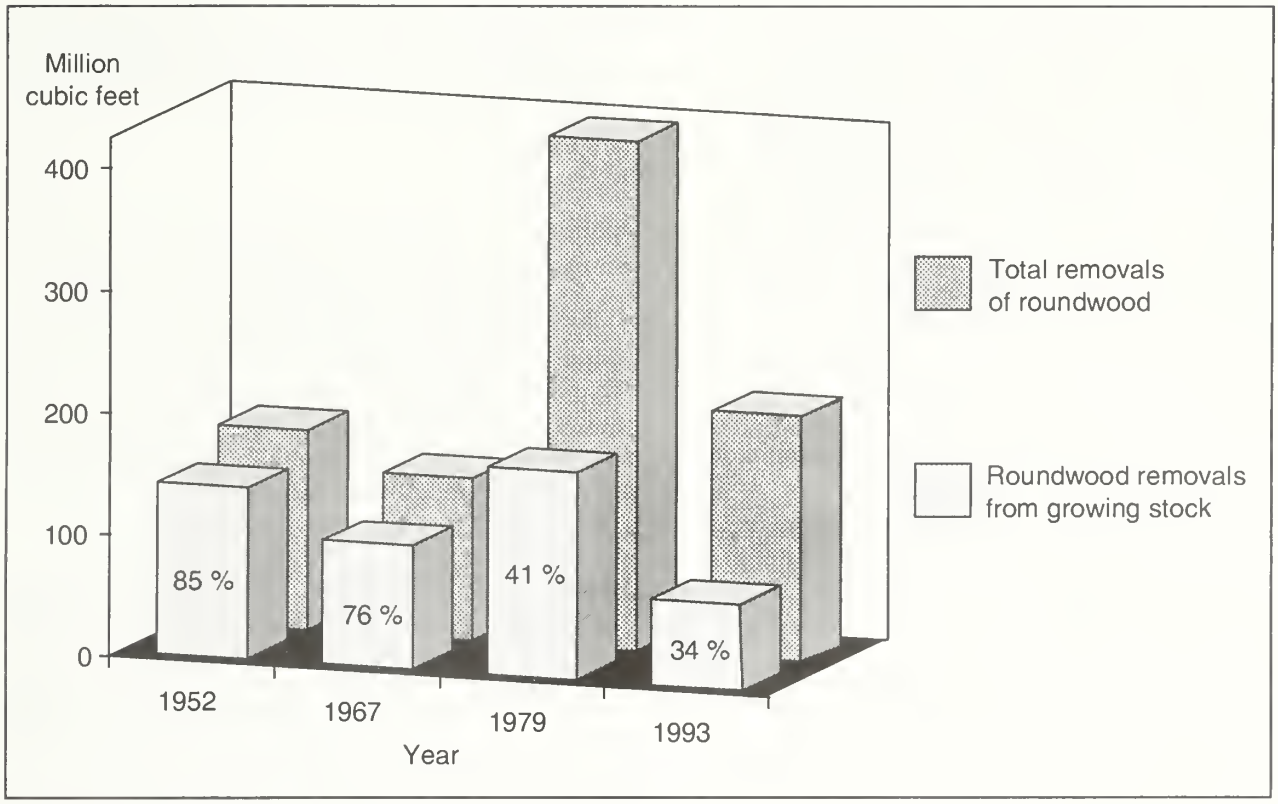

Figure 2.–Trends in total roundwood removed and roundwood removed from growing stock.

The most recent inventory of New York's timberlands revealed that about 56 percent of the roundwood removed for sawlogs was from growing stock (Table 1). The remainder (34 percent) was from other sources, such as cull trees, dead trees, saplings, tops of trees, and trees on land classified as nonforest (fencerows, rights-of-way, etc.). Pulpwood has lower standards for accepting roundwood containing cull, so often is from sources other than growing stock. Only about 36 percent of the roundwood removed for pulpwood and composite products was from growing stock. Veneer and other products were removed from growing stock more often than pulpwood but less often than sawlogs. This is due primarily to the influence of "other products" (posts, poles, etc.) since veneer typically is removed exclusively from growing stock.

The remaining removals generally were from the limbs and tops of trees that were harvested. However, a significant proportion was from cull trees and cull sections of trees when pulpwood or composite products were removed. More than 28 percent was from these cull sources, nearly equaling the amount from limbs and tops when pulpwood or composite products were removed. By comparison, only 6 percent of sawlogs and other products was removed from cull trees and cull sections. The volume harvested from dead trees is significant only when fuelwood is harvested.

Multiproduct Recovery of Harvesting Residue

In New York during 1993, about 39 million cubic feet of logging residue were generated from (1) tree tops, (2) unmerchantable portions of tree stems, (3) trees destroyed in the process of building roads and skid trails, and (4) nongrowing-stock trees such as cull trees and dead trees (Table 1). Most of the residue left unused is low in quality but it can still be used for industrial and nonindustrial products. For example, harvesting residues can be converted into products such as small-dimension stock through secondary logging or harvesting of more than one product. A greater amount of unmerchantable material (by current standards) can be used to produce pulp or channeled into reconstituted board products. Other new and innovative uses for wood include soil amendments and mulch, bulking agents for sludge treatment, livestock bedding and feedstock, and chemical derivatives.

Harvesting residue also can be recovered and used for energy production. Although firewood recovery is sometimes profitable, the high cost of extracting unused material by relogging an area for most other timber products is a major barrier today. Higher end-product values in the future might offset these high costs of extraction. The immediate alternative is multiproduct harvesting to recover residual material.

If markets exist, a number of products can be recovered from each tree. Respondents to an ownership survey conducted at the same time as the resource inventory confirmed that multiproduct harvesting predominates (Table 2). Although there are more landowners (52 percent) who have harvested their timber for a single product, high levels of multiproduct harvesting suggest that there are sufficient local markets for more than one product. Of the timberland owners that have harvested timber or allowed it to be harvested from their land, more than 42 percent indicated that two or more products were removed. However, these landowners control about 64 percent of the ownerships being harvested.

When trees on timberland are harvested for more than one product, rates of recovery are improved. Merchantable limits are moved higher up the stem, smaller diameter trees are accepted, and quality standards are lowered. While industrial products such as sawlogs and pulpwood are harvested from a significant proportion of the timberland base (Table 3), fuelwood is the primary product harvested by number of owners and by timberland area. In fact, few owners (about 2,100 or 1 percent) who harvested two or three products did not include fuelwood as an additional product. New York's forest-land owners clearly have incorporated fuelwood into muiltiproduct harvesting throughout the state. Even so, a small amount of residual material will remain even with mutiproduct harvesting that includes fuelwood. To recover all residual biomass while maintaining the industrial supply, owners can included wood chips as a second or third product.

Whole-tree harvesting systems are considered the only means of recovering both the entire growing-stock inventory volume and the majority of residual material (Fig. 3). According to the most recent inventory, about 16 percent of the harvest is residue in a typical New York hardwood timber stand. Converting all of this logging residue into a usable product depends largely on the availability of local markets for fiber products or fuel, and whether the added value of the material is sufficient to pay for its extraction. However, there are opportunities to modify current multiproduct harvesting systems to improve the recovery of harvesting residues.

Conclusions

The tops of growing-stock trees are easily recovered because they are concentrated, accessible, and directly related to timber harvesting levels. In New York, nongrowing-stock trees, while distributed at random throughout the state's timberlands, are of use only when harvested with growing-stock trees. As the demand for wood fiber grows, more of the wood and bark in tree tops and nongrowing-stock trees will be recovered and processed at a profit.

Mulitproduct harvesting, which has become an established practice in New York, is a practical method for recovering these residues. Merchantability limits are being redefined and it is no longer necessary to think of residues as unmerchantable material. Most of the material that usually accumulates and decomposes if left unused seems ideally suited for wood chips and firewood. These products, already a component of some multiproduct operations, will play a greater role should demand for fuelwood increase in the future.

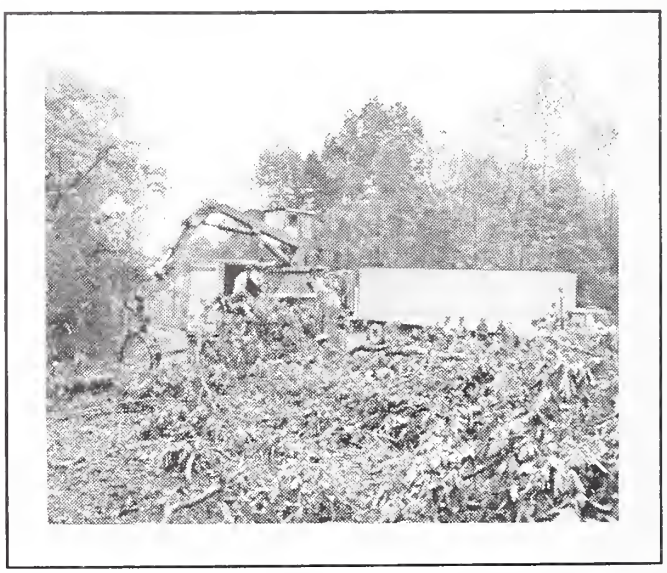

Figure 3.–Whole-tree harvesting sytems convert unused harvesting residue into whole-tree chips for a variety of products, notably pulp products and for energy production.

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Table 1.–Timber harvest by primary product group, major species group, and source of material,[a] New York, 1993

(in thousand cubic feet)

Primary product group and major species group	Growing stock	Cull trees or sections	Dead trees	Other sources	All sources
Sawlogs					
Softwoods	9,602	789	--	7,897	18,288
Hardwoods	31,816	4,048	839	19,479	56,183
Total	41,418	4,837	839	27,376	74,471
Pulpwood[b]					
Softwoods	10,133	5,792	--	11,659	27,584
Hardwoods	9,441	9,589	--	7,747	26,777
Total	19,574	15,381	--	19,406	54,361
Fuelwood[c]					
Softwoods	--	--	--	--	--
Hardwoods	5,981	18,804	20,796	25,540	71,121
Total	5,981	18,804	20,796	25,540	71,121
Other products[d]					
Softwoods	833	109	56	1,076	2,073
Hardwoods	722	94	19	443	1,278
Total	1,555	203	75	1,519	3,351
All products					
Softwoods	20,568	6,690	56	20,633	47,946
Hardwoods	47,959	32,536	21,654	53,209	155,358
Total	68,527	39,225	21,710	73,842	203,304
Harvesting residue					
Softwoods	1,208	861	--	3,446	5,516
Hardwoods	3,092	6,964	453	22,615	33,124
Total	4,301	7,825	453	26,062	38,640
Total harvest					
Softwoods	21,776	7,551	56	24,076	53,462
Hardwoods	51,051	39,500	22,107	75,824	188,482
Total	72,828	47,050	22,163	99,904	241,944

[a]Growing-stock trees, cull trees or sections, and dead trees are from timberland only. Other sources include trees less than 5.0 inches in diameter at breast height, tree tops and limbs from timberland, and material from nontimber land or nonforest land such as fencerows, pastureland, and urban areas.
[b]Includes composite products.
[c]Total fuelwood volumes are from Canham and Martin (1996).
[d]Includes veneer logs and miscellaneous products.

Table 2.–Number of owners and corresponding areas of timberland owned by number of products[a] harvested in New York, 1993

Products harvested (no.)	Number of owners	Percent	No. acres of timberland owned	Percent
One	99,400	52	2,774,100	30
Two	62,000	32	2,686,700	30
Three	13,400	7	1,634,700	18
Four of more	5,700	3	1,481,700	16
Don't know	2,600	1	190,700	2
No Answer	10,100	5	350,100	4
Total	193,200	100	9,118,100	100

[a]Includes industrial and nonindustrial products.

Table 3.–Number of owners and corresponding areas of timberland owned by products harvested in New York, 1993

Products harvested	Number of owners	Percent[a]	No. acres of timberland owned	Percent[a]
Sawlogs	57,200	30	5,240,000	57
Pulpwood	9,300	5	2,338,100	26
Fuelwood for personal use	149,200	77	6,273,300	69
Fuelwood for sale	20,600	11	2,299,800	25
Christmas trees	3,700	2	641,700	7
Other products for personal use	45,242	23	2,238,500	25
Other products for sale	3,300	2	654,300	7
Don't know	2,600	1	190,700	2
Total	193,200	151	9,118,100	218

[a]Values do not add to 100 because individual owners may harvest more than one product.

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